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Road vehicles — In-vehicle Ethernet —

Part 6: Electrical 100-Mbit/s physical entity requirements and conformance test plan

Véhicules routiers — Ethernet embarqué —

*Partie 6: Exigences et plan de tests de conformité de l'entité physique
à 100-Mbit/s électrique*



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Contents

	Page
Foreword	vi
Introduction	vii
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Symbols and abbreviated terms	2
4.1 Symbols.....	2
4.2 Abbreviated terms.....	2
5 Conventions	4
6 Wake-up and sleep features	4
6.1 Extension of physical coding sub-layer.....	4
6.2 Service primitives and interfaces.....	6
6.3 Power sequencing states.....	7
6.4 Command definitions.....	8
6.4.1 General.....	8
6.4.2 Low power sleep (LPS).....	8
6.4.3 Wake-up request (WUR).....	9
6.4.4 Wake-up pulse (WUP).....	9
6.5 Generation of scrambling bits <code>sdn[2:0]</code>	9
6.6 PCS PHY control state diagram.....	10
7 CTP test system and CTC structure	12
7.1 General.....	12
7.2 Test system set-up – Transmit test system.....	13
7.3 Test system set-up – Receive test system.....	14
7.4 CTC structure.....	15
8 PHY – Control IUT conformance test plan (with MII access)	16
8.1 PHY – Group 1: PHY control and timers (with MII access).....	16
8.1.1 Overview.....	16
8.1.2 CTC_4.1.1 – PMA reset (with MII access).....	16
8.1.3 CTC_4.1.2 – Value of <code>minwait_timer</code> – <code>minwait_timer</code> in TRAINING state (with MII access).....	17
8.1.4 CTC_4.1.3 – Value of <code>maxwait_timer</code> (with MII access).....	21
8.1.5 CTC_4.1.4 – Value of <code>stabilize_timer</code> (with MII access).....	22
8.2 PHY – Group 2: PHY control state diagram (with MII access).....	23
8.2.1 Overview.....	23
8.2.2 CTC_4.2.1 – PHY control state diagram - DISABLE TRANSMITTER state (with MII access).....	23
8.2.3 CTC_4.2.2 – PHY control state diagram - SLAVE SILENT state (with MII access).....	24
8.2.4 CTC_4.2.3 – PHY control state diagram – TRAINING state (with MII access).....	25
8.2.5 CTC_4.2.4 – PHY control state diagram – SEND IDLE state (with MII access).....	28
8.2.6 CTC_4.2.5 – PHY control state diagram – SEND IDLE OR DATA state (with MII access).....	31
8.3 PHY – Group 3: PHY link monitor state diagram (with MII access).....	35
8.3.1 Overview.....	35
8.3.2 CTC_4.3.1 – Link monitor state diagram – IUT does not enter the LINK OK state (with MII access).....	36
9 PCS – IUT conformance test plan (with MII access)	38
9.1 PCS – Group 1: PCS transmit (with MII access).....	38
9.1.1 Overview.....	38
9.1.2 CTC_3.1.1 – PCS signalling (with MII access).....	39

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9.1.3	CTC_3.1.2 – PCS reset (with MII access).....	41
9.1.4	CTC_3.1.3 – PCS transmit proper SSD (with MII access).....	41
9.1.5	CTC_3.1.4 – PCS transmit proper ESD (with MII access).....	42
9.1.6	CTC_3.1.5 – PCS transmit ESD with tx_error (with MII access).....	43
9.1.7	CTC_3.1.6 – PCS transmission of stuff bits (with MII access).....	44
9.1.8	CTC_3.1.7 – PCS tx_error (with MII access).....	44
9.2	PCS – Group 2: PCS transmit state diagram (with MII access).....	46
9.2.1	Overview.....	46
9.2.2	CTC_3.2.1 – PCS transmit state diagram - SEND IDLE state (with MII access).....	46
9.2.3	CTC_3.2.2 – PCS transmit state diagram - SSD1 VECTOR and SSD2 VECTOR states (with MII access).....	47
9.2.4	CTC_3.2.3 – PCS transmit state diagram - SSD3 VECTOR state (with MII access).....	47
9.2.5	CTC_3.2.4 – PCS transmit state diagram - TRANSMIT DATA state (with MII access).....	49
9.2.6	CTC_3.2.5 – PCS transmit state diagram - ESD1 VECTOR state (with MII access).....	50
9.2.7	CTC_3.2.6 – PCS transmit state diagram - ESD2 VECTOR state (with MII access).....	50
9.2.8	CTC_3.2.7 – PCS transmit state diagram - ESD3 VECTOR state (with MII access).....	51
9.2.9	CTC_3.2.8 – PCS transmit state diagram - ERR ESD1 VECTOR state (with MII access).....	52
9.2.10	CTC_3.2.9 – PCS transmit state diagram - ERR ESD2 VECTOR state (with MII access).....	53
9.2.11	CTC_3.2.10 – PCS transmit state diagram - ERR ESD3 VECTOR state (with MII access).....	54
9.3	PCS – Group 3: PCS receive (with MII access).....	54
9.3.1	Overview.....	54
9.3.2	CTC_3.3.1 – PCS receive signalling (with MII access).....	54
9.3.3	CTC_3.3.2 – PCS automatic polarity detection (with MII access).....	55
9.3.4	CTC_3.3.3 – PCS receive SSD (with MII access).....	56
9.3.5	CTC_3.3.4 – PCS receive ESD (with MII access).....	57
9.3.6	CTC_3.3.5 – PCS receive ERR ESD3 (with MII access).....	57
9.3.7	CTC_3.3.6 – PCS reception of stuff bits (with MII access).....	58
9.3.8	CTC_3.3.7 – PCS de-interleave ternary pairs (with MII access).....	59
9.4	PCS – Group 4: PCS receive state diagram (with MII access).....	59
9.4.1	Overview.....	59
9.4.2	CTC_3.4.1 – PCS receive state diagram (with MII access) - IDLE state.....	59
9.4.3	CTC_3.4.2 – PCS receive state diagram (with MII access) - CHECK SSD2 state.....	60
9.4.4	CTC_3.4.3 – PCS receive state diagram (with MII access) - CHECK SSD3 state.....	61
9.4.5	CTC_3.4.4 – PCS receive state diagram (with MII access) - SSD state.....	61
9.4.6	CTC_3.4.5 – PCS receive state diagram (with MII access) - BAD SSD state.....	62
9.4.7	CTC_3.4.6 – PCS receive state diagram (with MII access) - FIRST SSD state.....	63
9.4.8	CTC_3.4.7 – PCS receive state diagram (with MII access) - SECOND SSD state.....	64
9.4.9	CTC_3.4.8 – PCS receive state diagram (with MII access) - THIRD SSD state.....	65
9.4.10	CTC_3.4.9 – PCS receive state diagram (with MII access) - DATA state.....	65
9.4.11	CTC_3.4.10 – PCS receive state diagram (with MII access) - CHECK ESD2 state.....	66
9.4.12	CTC_3.4.11 – PCS receive state diagram (with MII access) - CHECK ESD3 state.....	67
9.4.13	CTC_3.4.12 – PCS receive state diagram (with MII access) - BAD ESD2 state.....	68
9.4.14	CTC_3.4.13 – PCS receive state diagram (with MII access) - BAD END and RX ERROR states.....	69
9.5	PCS – Group 5: PCS JAB state diagram (with MII access).....	70
9.5.1	Overview.....	70
9.5.2	CTC_3.5.1 – PCS JAB state diagram (with MII access) - rcv_max_timer	70
10	PMA – IUT requirements and conformance test plan (with MII access).....	71

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10.1	PMA – Group 1: PMA electrical measurements (with MII access).....	71
10.1.1	Overview.....	71
10.1.2	CTC_5.1.1 – PMA maximum transmitter output droop (with MII access).....	71
10.1.3	CTC_5.1.2 – PMA transmitter distortion (with MII access).....	72
10.1.4	CTC_5.1.3 – PMA transmitter timing jitter (with MII access).....	73
10.1.5	CTC_5.1.4 – PMA transmitter power spectral density (PSD) (with MII access).....	74
10.1.6	CTC_5.1.5 – PMA transmit clock frequency (with MII access).....	76
10.1.7	CTC_5.1.6 – PMA MDI return loss (with MII access).....	77
10.1.8	CTC_5.1.7 – PMA MDI mode conversion loss (with MII access).....	79
10.1.9	CTC_5.1.8 – PMA transmitter peak differential output (with MII access).....	82
10.2	PMA – Group 2: PMA receive tests (with MII access).....	83
10.2.1	Group 2 overview.....	83
10.2.2	CTC_5.2.1 – PMA bit error rate verification (with MII access).....	83
10.2.3	CTC_5.2.2 – PMA receiver frequency tolerance (with MII access).....	84
10.2.4	CTC_5.2.3 – PMA alien crosstalk noise rejection (with MII access).....	85
	Annex A (informative) PHY control – Test suite.....	87
	Annex B (normative) PCS – Test suite.....	91
	Annex C (normative) PMA – Test system set-ups.....	110
	Bibliography.....	123

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 31, *Data communication*.

A list of all parts in the ISO 21111 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

The ISO 21111 series includes in-vehicle Ethernet requirements and test plans that are disseminated in other International Standards and complements them with additional test methods and requirements. The resulting requirement and test plans are structured in different documents following the Open Systems Interconnection (OSI) reference model and grouping the documents that depend on the physical media and bit rate used.

In general, the Ethernet requirements are specified in ISO/IEC/IEEE 8802-3. The ISO 21111 series provides supplemental specifications (e.g. wake-up, I/O functionality), which are required for in-vehicle Ethernet applications. In road vehicles, Ethernet networks are used for different purposes requiring different bit-rates. Currently, the ISO 21111 series specifies the 1-Gbit/s optical and 100-Mbit/s electrical physical layer.

The ISO 21111 series contains requirement specifications and test methods related to the in-vehicle Ethernet. This includes requirement specifications for physical layer entity (e.g. connectors, physical layer implementations) providers, device (e.g. electronic control units, gateway units) suppliers, and system (e.g. network systems) designers. Additionally, there are test methods specified for conformance testing and for interoperability testing.

Safety (electrical safety, protection, fire, etc.) and electromagnetic compatibility (EMC) requirements are out of the scope of the ISO 21111 series.

The structure of the specifications given in the ISO 21111 series complies with the Open Systems Interconnection (OSI) reference model is specified in ISO/IEC 7498-1^[1] and ISO/IEC 10731^[3].

ISO 21111-1 defines the terms which are used in this series of standards and provides an overview of the standards for in-vehicle Ethernet including the complementary relations to ISO/IEC/IEEE 8802-3 and the amendments, the document structure, type of physical entities, in-vehicle Ethernet specific functionalities, and so on.

ISO 21111-2 specifies the interface between reconciliation sublayer and physical entity including reduced gigabit media independent interface (RGMI), and the common physical entity wake-up and synchronised link sleep functionalities, independent from physical media and bit rate.

ISO 21111-3 specifies supplemental requirements to a physical layer capable of transmitting 1-Gbit/s over plastic optical fibre compliant with ISO/IEC/IEEE 8802-3, with specific application to communications inside road vehicles, and a test plan for physical entity conformance testing.

ISO 21111-4^[3] specifies the optical components requirements and test methods for 1-Gbit/s optical in-vehicle Ethernet.

ISO 21111-5 specifies, for 1-Gbit/s optical in-vehicle Ethernet, requirements on the physical layer at system level, requirements on the interoperability test set-ups, the interoperability test plan that checks the requirements for the physical layer at system level, requirements on the device-level physical layer conformance test set-ups, and device-level physical layer conformance test plan that checks a set of requirements for the OSI physical layer that are relevant for device vendors.

This document specifies advanced features of an ISO/IEC/IEEE 8802-3 in-vehicle Ethernet physical layer (often also called transceiver), e.g. for diagnostic purposes for in-vehicle Ethernet physical layers. It specifies advanced physical layer features, wake-up and sleep features, physical layer test suite, physical layer control requirements and conformance test plan, physical sublayers test suite, and physical sublayers requirements and conformance test plan.

ISO 21111-7 specifies the implementation for ISO/IEC/IEEE 8802-3, which defines the interface implementation for automotive applications together with requirements on components used to realize this Bus Interface Network (BIN). ISO 21111-7 also defines further testing and system requirements for systems implemented according to the system specification. In addition, ISO 21111-7 defines the channels for tests of transceivers with a test wiring harness that simulates various electrical communication channels.

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ISO 21111-8 specifies the transmission media, the channel performance, and the tests for an ISO/IEC/IEEE 8802-3 in-vehicle Ethernet.

ISO 21111-9 specifies the data link layer requirements and conformance test plan. It specifies the requirements and test plan for devices and systems with bridge functionality.

ISO 21111-10 specifies the application to session layer requirements and conformance test plan. It specifies the requirements and conformance test plan for devices and systems that include functionality related with OSI layers from 7 to 5.

ISO 21111-11 specifies the transport to network layer requirements and conformance test plan. It specifies the requirements and conformance test plan for devices and systems that include functionality related with OSI layers from 4 and 3.

Figure 1 shows the parts of the ISO 21111 series and the document structure.

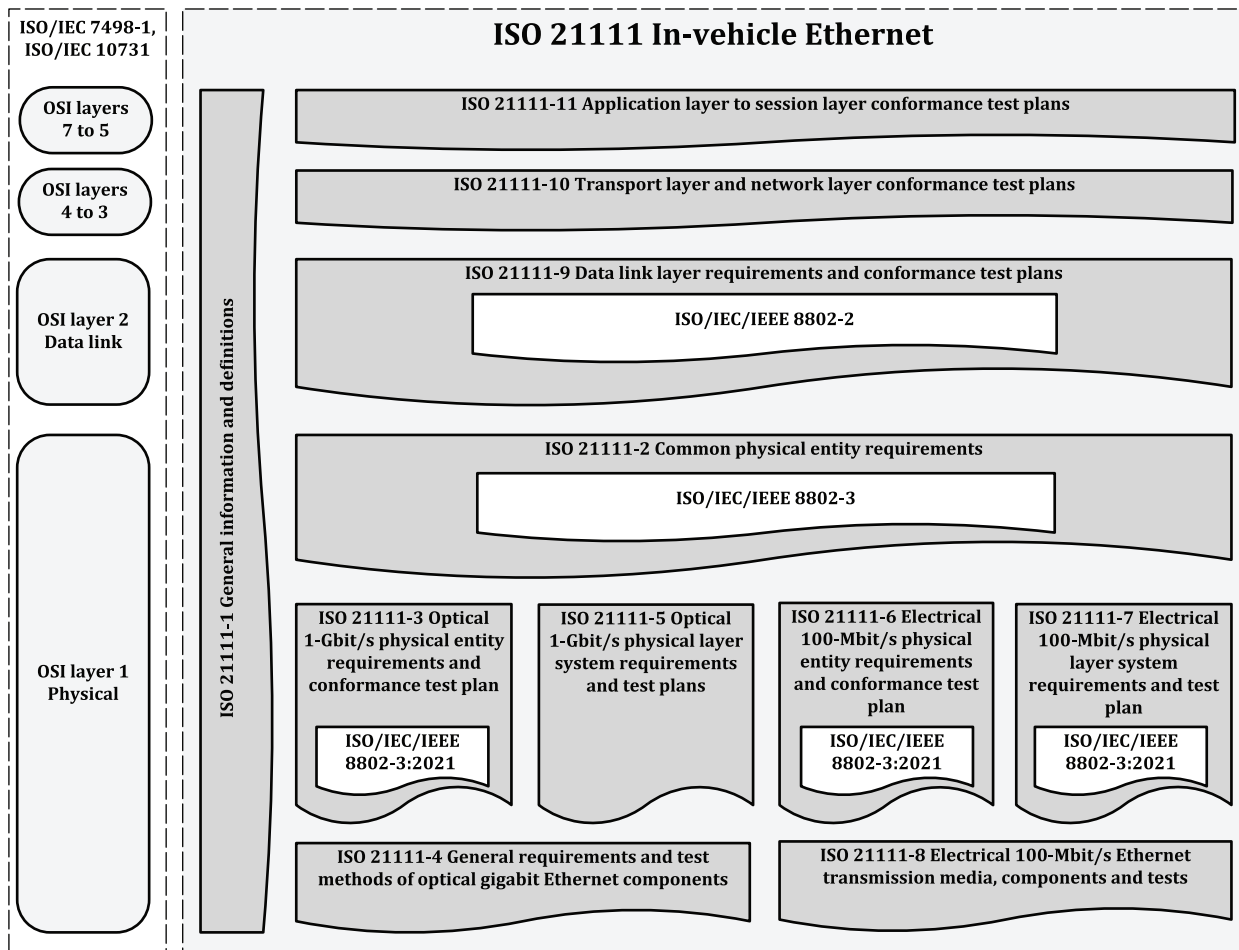


Figure 1 — In-vehicle Ethernet document reference according to OSI model